

A photograph of a wide waterfall cascading over a dark, layered rock face. The water is white and frothy as it falls. Below the waterfall, a river flows over a bed of large, dark rocks. In the foreground on the right, a person wearing a hat and waders is standing in the river, likely fishing. The background shows more of the rocky cliff and some greenery on the right side.

Lesson 2

R Is for River

This lesson focuses on rivers as ecosystems and includes information about where river water comes from and how it flows from one ecosystem to another. By following the journey of a river and noting how different animals and plants thrive at various places along the river, students grasp the relationship between habitat and adaptation.

Students discover that water is a resource and natural **connector** among the ecosystems that make up the world in which they live; they also learn that the story of the river is part of their own story.

Students are actively engaged in this lesson by sharing information and ideas about what they see in pictures depicting animals, plants, and other natural features of a river ecosystem. They participate in con-

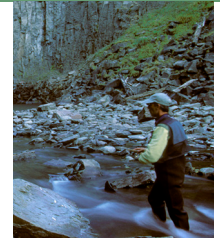
cept mapping, study a relief map of California to identify major rivers, and develop a diagram depicting the course of a river. Students also follow words from left to right, describe places and animals, and follow oral directions.

Learning Objectives

List different habitats (ecosystems) that are found in mountains, rivers, oceans, valleys, deserts, and in their local area.

Name some of the plants and animals that live in their local area.

Identify resources (goods and ecosystem services) that people use in everyday life (e.g., food, air, water, clothing).



which it lives.

The entire area of land draining into a specific river or river system is called a watershed. Water drains from the highest elevations within the watershed to the lowest. In a large watershed, dozens of small rivers and streams may flow, eventually, into a main river. Most of California's rivers are part of a watershed that drains into the Pacific Ocean. Parts of eastern California and the Southern San Joaquin Valley are in the Great Basin watershed, an area of the United States that does not drain into any ocean; instead, river water drains into natural reservoirs, including Lake Tahoe and Mono Lake.

Rivers and river ecosystems help people meet their basic needs for food and water. While fish, waterfowl, and plants are directly harvested from rivers for human use, the water from rivers is also used for drinking, washing, manufacturing, growing other foods (irrigating crops), and generating electrical power for cities. Water is a connector that ties humans to river ecosystems and connects the parts of the river ecosystem. Water also connects river ecosystems to the other ecosystems (mountains, valleys, deserts, and oceans) on Earth.

Background

Varied animals and plants live in and near rivers (riparian areas). Their physical features and behaviors suit them to survival in the part of the river ecosystem in which they live. They must be able to adjust to an environment that can change dramatically from season to season and from place to place.

The flow of water in a river changes along its course. It flows fast over

rocky beds in the mountains and slowly as it gets close to the sea, where river beds often have sandy or muddy bottoms. The **habitats** for animals in and along the river vary as the river moves along its course. Some animals are aquatic dwellers, like fish. Others are land dwellers, like egrets and other wading birds. Some live both in the water and on the land, like otters. Each animal in the river ecosystem is adapted to survive in the habitat in



Key Vocabulary

Connector: Something that joins other things together.

Habitat: The place where a living thing lives and meets its basic needs.

Toolbox



Summary of Activities

Students study photo cards and a relief map of California. They participate in developing a concept map and create a “Flow of a River” diagram. They gather information to determine if there is a riparian area in their community.



Instructional Support

See Unit Resources, pages 20-21

Prerequisite Knowledge



- Students should be able to participate in a group discussion by relating comments to the discussion topic and listening to what others say.
- Students must be able to speak clearly enough to be understood by others.
- Students need to understand simple oral directions and be able to gather information from pictures.

Advanced Preparation



Make copies:

Make copies as indicated in the Activity Masters section below.

Create river diagram:

On chart paper, make a large copy of the “Flow of a River” diagram from Part 2 of *The World Around Me* (Lesson 1 Visual Aid).

Cut out “River Boat Ride” tickets:

Cut out “River Boat Ride” tickets provided as an Activity Master (see below).

Make binoculars or spy glasses:

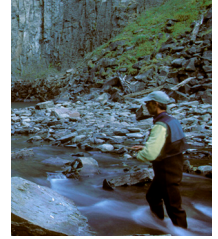
Collect empty toilet paper tubes and/or paper towel tubes and use them to make binoculars (two toilet paper tubes taped together) or a spy glass (one paper towel tube) for each pair of students.

Arrange for assistance:

If possible, arrange for a classroom aide or parent volunteer to assist with this lesson. Explain what you would like them to look for when assessing students’ understanding of the related concepts (see Student Assessment).

Prepare Visual Aids:

Produce materials as indicated in the Visual Aids section.



Materials Needed



E Is for Earth books:

From Lesson 1

Toilet paper or paper towel tubes:

One (paper towel) or two (toilet paper) per pair

Class Supplies:

Chart paper, crayons or colored pencils, marker, pencils

Activitiy Masters:

See below

Visual Aids



Big Book:

The World Around Me

Map:

Relief Map of California, page 93

Photo cards:

Animals in a River Ecosystem, pages 94-98

Duration



Preparation time:

30-40 min.

Instructional time:

50-60 min.



Safety Notes

None

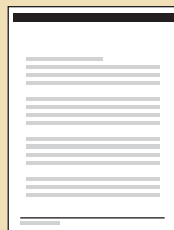
Activity Masters



River Boat Tickets

Page 83

One per student



River Assessment Checklist

Page 84

One per class

Procedures

Step 1

Show students the “R Is for River” page in *The World Around Me* (Lesson 1 Visual Aid). Call attention to human activity such as the river boat depicted in the picture, as well as some of the plants and animals and the places where they live (ducks in the shallow water, and worms that burrow in the sand). Tell students that where an animal lives is called its habitat; in its habitat, an animal finds what it needs to stay alive (food, water, shelter). Explain that rivers provide many different kinds of habitats for animals and plants; the way the water flows or moves makes a big difference in the kinds of animals and plants that can survive in a river or in a certain part of a river.

Step 2

Explain the difference between habitat and ecosystem. Habitats exist within ecosystems. Like a school that is part of a neighborhood, a habitat is one part of an ecosystem. A habitat is the place in an ecosystem where an organism lives and meets its needs. An ecosystem is an environment or place that is made up of different living things and non-living things that are connected and that help other living things survive.

Step 3

Call attention to some of the habitats depicted on *The World Around Me* “R Is for River” page: mudflats, shrubs, sandbanks, rocks in the water, grasses, and so on. Write the words “dwell,” “dwelling,” and “dweller” on the board. Have the students identify what is the same in all three words (the letters d-w-e-l-l). Explain that “to dwell” means to live in a certain place. Write the words “**aquatic dwellers**” and “**land dwellers**” on the board. Ask the students to guess what a land dweller is (*someone or something that lives on the land*). Have the students look at the “R Is for River” page and identify some land dwellers (*birds and insects*). Mention that the term “dweller” usually refers to animals and people—not plants. Ask the students to guess what an “aquatic dweller” is (*someone or something that lives in the water*). Also have them identify some of the aquatic dwellers pictured on the “R Is for River” page (*fish, snails, clams*). Point out that some animals live both on the land and in the water.

Step 4

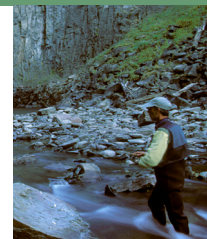
Call attention to the duck in the picture on the “R Is for River” page. Tell them that this duck gets food by digging in the mud with its beak. Also call attention to the kingfisher with an insect in its mouth. Ask, “Is the kingfisher a living thing? Is the insect a living thing?” Explain that living things often eat other living things in their ecosystem in order to survive. Have the students give other examples of this (spiders eating insects, bears eating fish, eagles eating rabbits). Remind the students that all the living and nonliving things shown in the river picture make up the river ecosystem—that all these things are connected and help the living things to survive. Have students give examples of the how things in the river ecosystem are connected.

Step 5

Discuss the different sections of a river (rapids, meanders, oxbow lakes). Have students look closely at the picture and identify how the conditions along the river and the habitats in and near the river differ along the course of the river. Explain that most rivers start as fast-flowing streams in the hills or mountains. As a river reaches lower ground, its slope is less steep and the water flow becomes smoother. At the lower levels, the water is calmer and the sand and mud tends to settle. Some animals such as worms and mussels bury themselves in the mud. In the shallower water, some weeds take root. Explain that the mud is a habitat for worms, mussels, and other animals.

Step 6

Tell students they will be going on a river boat ride today to look more closely at some of the animals that live in or near a river. Give each student a “River Boat Ticket.” Pair students and invite them on board. Give each pair binoculars (toilet paper tubes fastened together) or a spy glass (single paper towel tube). Also give each pair a Photo Card depicting an ani-



mal living in the water or on the bank of the river. Allow time for students to closely observe the features of the animal and what they see around it (for example, water, mud, sand, tree, bush). Tell them to discuss their observations of animals and habitats with their partners. Ideally, classroom aides or parent volunteers would be involved in this part of the lesson so that every student has an opportunity to share and be given feedback.

Step 7

Tell students you are docking the boat and that they should gather in a circle to tell everyone about their animal and its habitat. Encourage students to speak audibly in complete, coherent sentences. As they take turns describing their animals, use guided questions to encourage them to make connections between the animal and its habitat:

- Does this animal live in the water of the river or on the land near the river?
- How does this animal use the parts of the river ecosystem to live?
- What does this animal eat? Where does it go for shelter? Where does it sleep?

Write student responses on chart paper.

Step 8

With student input, develop a concept map depicting some of the parts and connectors in a river ecosystem. (See the example in *The World Around Me - Part 2*.) Start the discussion by asking, “What are the parts of a river ecosystem?”

Step 9

Ask students, “Why are rivers important to us?” (They provide fish, water for crops, water for other human uses such as drinking and bathing.) Use other leading questions to help students make connections between humans and some of the resources we get from a river ecosystem:

- Can you think of something in the grocery store that comes from a river? (Water, fish)
- Have you used anything today that comes from a river? (Water)
- Can you think of something in our town or city that has a connection to a river? (Water tower, water pipes, water treatment plant)
- Can you think of something in our school that has a connection to a river? (Water, water pipes)
- What is the closest river to our school? (Answers will vary.) How do people use this river? (Irrigation, boating, fishing, kayaking, transporting people and goods, other answers.)

Step 10

Use the **Relief Map of California** (Lesson 2 Visual Aid) to locate the river closest to students’ city or town. Ask students to think about where the water in the river comes from and where it might be going. Have students trace the flow of the river on the map with their fingers. Ask them to connect the mountains to the river and the river to the ocean. Have them look at the “Flow of a River” diagram you have enlarged from *The World Around Me - Part 2*. Call attention to the way water comes from many sources and directions to enter a river and then the ocean.

Step 11

Return students’ individual *E Is for Earth* (Lesson 1 Activity Master) books. Have them turn to the river page and add (by drawing) some parts of the river ecosystem (for example, plants, animals, mud). Give them time to describe what they drew. Ideally, classroom aides or parent volunteers will be involved in this part of the lesson so that each student will have a chance to share and be given an opportunity for feedback. Collect the books when students have completed their work.

Lesson Assessment

Instructions

Description:

Student assessment for this lesson is performance-based and embedded throughout the lesson. The embedded assessment consists primarily of inquiry questions with oral responses. What is being assessed is the student's knowledge and understanding of concepts relating to the EEI Learning Objectives. To estimate or determine each student's knowledge, understanding, and skill, all students need to participate actively in the discussion, and their individual responses should be evaluated for accuracy.

Students should also be asked to explain some of their ideas to check for any misconceptions. Where appropriate, students should be asked to speak in complete sentences. For this lesson, it would be ideal to have classroom aides or parent volunteers to assist in listening to individual student's responses and provide appropriate feedback, because some of the activities involve students working in pairs and then describing their ideas to each other.

Instructions:

Each student should have a chance to discuss the following with a teacher or another adult prepared to assess students' responses and provide feedback:

1. Describe an animal that lives in the river ecosystem. How does it survive in its habitat within a river ecosystem?
2. How are the habitats along a river different?
3. How do animals have their basic needs met by a river ecosystem? What does your animal eat? Where does it find its food? Where does your animal go for shelter?
4. What do people get from the river that they use in daily life?

Suggested Scoring

Use the **River Assessment Checklist** (Lesson 2 Activity Master) to record students' performance.

Rivers Assessment Checklist (Lesson 2 Activity Master)

Student's Name	Can describe a river animal, plant or habitat	Can identify how a river-dwelling animal's needs are met	Can identify how parts of a river ecosystem are connected	Can identify how river resources are used by people	Can use vocabulary words in meaningful context
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